H.M. Shadman Tabib

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hm-shadman-tabib | shadmantabib

Research Interests

Computational Biology: Cryo-ET image analysis, connectomics segmentation, RNA task accuracy estimation.
Computer Vision & AI for Health: Medical imaging (cancer), multimodal/semi-supervised learning, bioimage segmentation, BCI (epilepsy), real-time systems.
Machine Learning: Unsupervised detection/segmentation, contextualized ML, LLM-as-a-judge for synthetic data evaluation.

Education

- **Bangladesh University of Engineering and Technology (BUET)** *2022 – Present*
  Senior Year Undergraduate Student in Department of Computer Science and Engineering Dhaka, Bangladesh
  Thesis Supervisors: Dr. M. Sohel Rahman, Dr. Md. Shamsuzzoha Bayzid.

Research Experience

- **Carnegie Mellon University (Xu Lab)** *Jun 2024 – Present*
  Remote Research Collaborator Pittsburgh, PA, USA (Remote)
  Advisor: Dr. Min Xu
  *Worked on unsupervised Cryo-ET segmentation **[Submitted]** and prepared novel particle picking algorithm **[Accepted]**. Conducted denoising for high-resolution biological structure reconstruction.*

- **University of Wisconsin–Madison (Adaptive Inference Lab)** *Sep 2024 – Sep 2025*
  Remote Research Collaborator Madison, WI, USA (Remote)
  Advisor: Dr. Ben Lengerich
  *Co-authored a comprehensive review on contextualized machine learning and interpretability in foundation models. Contributing to the AdaptInfer framework and contextual awareness in data-driven modeling. **[Completed]***

- **Stanford University** *Sep 2025 – Present*
  Remote Research Collaborator Stanford, CA, USA (Remote)
  Advisor: Dr. Muyuan Chen
  *Conducting segmentation and analysis of Hydra Plasma Focused Ion Beam (PFIB) tomography data for structural interpretation and morphology reconstruction. **[Ongoing]***

- **Bangladesh University of Engineering and Technology (BUET)** *Jan 2023 – Present*
  Undergraduate Research Assistant Dhaka, Bangladesh
  Supervisor: Prof. Dr. M. Sohel Rahman
  *Semi-supervised and multimodal breast cancer classification using contextualized vision pipelines for medical imaging **[Accepted]** and connectomics EM segmentation. **[Ongoing]***

  Supervisor: Prof. Dr. Md. Shamsuzzoha Bayzid
  *Developing RNA segmentation and multimodal model training frameworks for biological connectomics; investigating task accuracy and ablation paradigms across modalities **[Ongoing]***

  Supervisor: Prof. Dr. A.B.M. Alim Al Islam
  *Designed EEG-based context-aware deep learning systems for single-electrode epilepsy prognosis and real-time brain–computer interface modeling.**[Accepted]***

  Supervisor: Prof. Dr. Ch. Md. Rakin Haider
  *Developing SpectraSentinel — a dual-stream, lightweight real-time drone detection and tracking system combining spectral and spatial fusion cues. **[Submitted]***

  Supervisor: Prof. Dr. M. Saifur Rahman
  *Developing Fair-RAG-IM — a bias-aware retrieval-augmented generation framework for clinical predictions, focusing on interpretability and equitable medical decision-making.**[Ongoing]***

  Supervisor: Dr. K.M. Ariful Kabir
  *Modeling stochastic spatio-temporal epidemiology on multiplex networks; simulating socioeconomic epidemic spread through agent-based models using Mesa.**[Submitted]***

Publications

[1] **Unsupervised Multi-scale Segmentation of Cellular Cryo-electron Tomograms with Stable Diffusion Foundation Model**.
Mostofa Rafid Uddin, Thanh-Huy Nguyen*, **H.M. Shadman Tabib***, Kashish Gandhi, Min Xu.
CVPR - Submitted [pdf] *2025*

[2] **Localization of Macromolecules in Crowded Cellular Cryo-electron Tomograms from Extremely Sparse Labels**.
Mostofa Rafid Uddin, Ajmain Yasar Ahmed*, **H.M. Shadman Tabib***, Md Toki Tahmid, Md Zarif Ul Alam, Zachary Freyberg, Min Xu.
Briefings in Bioinformatics — Accepted [pdf] *2025*

[3] **NEUROSKY-EPI: The First Open Single-Electrode Epilepsy EEG Dataset with Context-Aware Modeling**.
H.M. Shadman Tabib, Md. Hasnaen Adil, Ayesha Rahman, Ahmmad Nur Swapnil, Maoyejatun Hasana, A.B.M. Alim Al Islam.
NeurIPS 2025 Workshop on Time Series for Health (TS4H) — Accepted [OpenReview] *2025*

[4] **Contextualized Machine Learning: Towards Adaptive, Interpretable, and Generalizable AI Systems**.
Ben Lengerich,Caleb Ellington, Sazan Mahbub **H.M. Shadman Tabib**, et al.
UW–Madison Research Project [GitHub] *2025*

[5] **End-to-End Bangla AI for Solving Math Olympiad Problem Benchmark**.
H.M. Shadman Tabib, Jaber Ahmed Deedar.
International Journal of Natural Language Computing (IJNLC) — Accepted [pdf] *2024*

[6] **Breast Cancer Detection Using Semi-Supervised Learning: Multimodal Data Integration and Comparative Demographic Analysis**.
H.M. Shadman Tabib, Mst. Fahmida Sultana Naznin, Sadatul Islam Sadi, Md. Hasnaen Adil, Zarin Tasnim Oishi, M. Sohel Rahman.
NSyS 2024 (11th Intl. Conf. on Networking, Systems, and Security) - Accepted as Poster [pdf] *2024*

[7] **Study on Locomotive Epidemic Dynamics in a Stochastic Spatio-Temporal Simulation Model on a Multiplex Network**.
H.M. Shadman Tabib*, Jaber Ahmed Deedar*, K.M. Ariful Kabir.
arXiv [pdf] *2025*

[8] **SpectraSentinel: Lightweight Dual-Stream Real-Time Drone Detection, Tracking and Payload Identification**.
Shahriar Kabir, Istiak Ahmmed Rifti, **H.M. Shadman Tabib**, Mushfiqur Rahman, Sadatul Islam Sadi, Hasnaen Adil, Ahmed Mahir Sultan Rumi, Ch. Md. Rakin Haider.
arXiv [pdf] *2025*

[9] **Exploring Livelihood Dynamics and Policy Interventions in Mangrove Social-Ecological Systems with Agent-Based Modeling: A Mesa Framework Approach**.
Anik Saha, **H.M. Shadman Tabib**, M. Sohel Rahman.
arXiv [PDF] *2024*

[10] **Toward Trustworthy Difficulty Assessments: Large Language Models as Judges in Programming and Synthetic Tasks**.
H.M. Shadman Tabib, Jaber Ahmed Deedar.
arXiv [pdf] *2025*

Position

- **Research & Innovation Centre (RIC),Bangladesh University of Engineering and Technology (BUET)** *Feb 2025 – Present*
  Part-Time Research Engineer Dhaka, Bangladesh
  Project: Identification of Dengue Breeding Sites through Object Recognition (HE-01-244).
  Contributing to dengue vector surveillance using deep learning–based object recognition and image analysis for public health applications.

Awards & Recognitions

- **Global Champion — Johns Hopkins Healthcare Design Competition (Team NeoScreenix)** *2025*
  National Daily News Coverage: Daily Star, TBS News, UNB News; TV coverage: YouTube
- **Global 2nd Runner-up — IEEE SPS Video & Image Processing (VIP) Cup** *2025*
  International competition on video & image processing
- **Datathons** *2024 – 2025*
  KUET 2025 (Top 5%); BUET DL Sprint 2024 (Top 15%); CZI Kaggle 2024 (Top 43%); SUST DL Enigma 2024 (Top 34%)

- **Dean's & University Merit Scholarships — BUET** *2022 – Present*
  Sustained academic excellence (CGPA $>$ 3.75 over three consecutive years) and topped in the department
- **Champion — Bangladesh Biology Olympiad (BdBO)** *2019*
- **Second Runner-up — Bangladesh Mathematical Olympiad (BdMO)** *2019–2020*
- **Winner — Bangladesh Physics Olympiad (BdPhO)** *2019*
- **4th Place & Extended National Camper — Bangladesh Chemistry Olympiad (BdChO)** *2020*
  Ranked 4th nationally and selected for extended national camp to represent Bangladesh at IChO 2020.

Entrepreneurship & Leadership

- **Co-Founder & Head of Research — PinkLifeLine** *Jan 2025 — Present*

  ◦ Health-tech startup from NeoScreenix (**JHU 2025 Global Champion**); funded by Bangladesh National ICT Division.
  ◦ **Collaborations:** Partnered with Sustainlaunch Labs (global innovation accelerator) and Herwill (USA based global women's empowerment & digital inclusion).
  ◦ Built and leads a **50+ medical professionals' network**; leads ML clinical data pipelines & screening workflows.

- **Lead Organizer & Problem Setter — BUET CSE Fest Deep Learning Sprint 2025** *Nov 2025 — Jan 2026*

  ◦ Coordinated largest national **AI datathon**; designed problems and rubric, and supervised judging.
  ◦ Collaborated with academic & industry mentors to ensure high-quality competition standards.

Technical Skills

- **Programming:** Python, PyTorch, TensorFlow, Keras, C/C++, Java, SQL, JavaScript, Dart
- **ML/AI:** Computer Vision, Deep Learning, NLP, Unsupervised Learning, Agent-Based Modeling
- **Specialized:** Cryo-ET Processing, Medical Imaging, Bioimage Analysis, Mesa, Flutter
- **Development:** Django, HTML/CSS, Node, React, Spring, Database Design, Git, LaTeX

References

1. **Prof. Dr. M. Sohel Rahman** — Professor, Dept. of CSE, BUET.
   Email: sohel.kcl@gmail.com | Google Scholar
2. **Prof. Dr. Md. Shamsuzzoha Bayzid** — Professor, Dept. of CSE, BUET.
   Email: bayzid@cse.buet.ac.bd | Google Scholar
3. **Dr. Min Xu** — Associate Professor, Computational Biology Dept., Carnegie Mellon University.
   Faculty Profile
4. **Dr. Ben Lengerich** — Assistant Professor, University of Wisconsin–Madison.
   Personal Website